Laborator si seminar

Programare in Java si software matematic

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Math in Java

- The Math class contains static methods implementing math functions, such as:
  - oTrigonometry: **sin()**, **cos()**, **tan()**, etc.
  - oRounding: **round()**, **floor()**, **ceil()**, **rint()**
  - oLogarithmic: **log()**, **log10()**
  - oExponentiation/root: **sqrt()**, **cbrt()**, **pow()**, **exp()**
  - oUtility: **abs()**, **min()**, **max()**, **random()**, **hypot()**, **toDegrees()**, **toRadians()**
- Match also includes constants for PI and E.

Math in Java

Java ships with java.lang.StrictMath, which has the same functions as Math. What's different with StrictMath is that its functions produce the same results as certain published algorithms, namely the C-based netlib and "Freely Distributable Math Library".

Java also comes with java.math package which includes:

- BigDecimal - Immutable arbitrary-precision signed decimal number.
- BigInteger - Immutable arbitrary-precision integer.

These two classes have their own methods for various operations, including arithmetic and bitwise.

Example

```java
package lab6;

import java.util.Scanner;

public class MathDemo {
    public static void main (String args[]) {
        Scanner in = new Scanner (System.in);
        //Basic Math Functions
        System.out.println ("Va rugam sa introduceti un numar intreg");
        int i = in.nextInt();
        System.out.println("Valoarea absoluta este " + Math.abs(i));
        System.out.println("Va rog sa ma introduceti un numar intre");
        int j = in.nextInt();
        System.out.println(Math.abs(i) + " modulo "+Math.abs(j)+" este "+Math.abs(j)%Math.abs(j));
        System.out.println("Maximum dintre " +i+ " si "+j+" este "+Math.max(i, j));
        System.out.println("Minimum dintre " +i+ " si "+j+" este "+Math.min(i, j));
        System.out.println ("Va rugam sa introduceti un numar real");
        double d = in.nextDouble();
        System.out.println("Valoarea rotunjita in sus este " + (int)Math.ceil(d));
        System.out.println("Valoarea rotunjita in jos este " + (int)Math.floor(d));
        System.out.println("Valoarea rotunjita este " + (int)Math.floor(d));
        System.out.println("un numar generat de 2 digiti este " + Math.round(Math.random()*100));

        //Exponential and Logarithmic Math Functions
        System.out.println("Introduceti doua numere");
        double b = in.nextDouble();
        double e = in.nextDouble();
        System.out.println(b+" la puterea "+e+" este "+Math.pow(b, e));
        System.out.println("Radical din "+b+" este "+Math.sqrt(b));
        System.out.println("Radical din "+e+" este "+Math.sqrt(e));
        System.out.println("logaritm in baza 10 a lui "+e+" este "+Math.log10(e));
        System.out.println("logaritm in baza 10 a lui "+b+" este "+Math.log10(b));
        System.out.println("logaritm natural a lui "+e+" este "+Math.log(e));
        System.out.println("logaritm natural a lui "+b+" este "+Math.log(b));

        //Trigonometric Math Functions
        double degrees = Math.toDegrees(Math.PI);
        System.out.println("degrees = " + degrees);
        double radians = Math.toRadians(180);
        System.out.println("radians = " + radians);
        System.out.println("Sinusul unui unghi de 90 de grade este "+Math.sin(Math.toRadians(90)));
        System.out.println("Cosinusul unui unghi de 90 de grade este "+Math.cos(Math.toRadians(90)));
        System.out.println("Tangenta unui unghi de 90 de grade este " + Math.tan(Math.toRadians(90)));

        in.close();
    }
}
```

Homework

Please use Math.Radom() method to generate an array of integer elements. Using Math.min() and Math.max please calculate the minimum and maxim values of the Array's elements.

Please calculate in an Array of Arrays: sin, cos and tangent for the following angles: 0, 45, 90 and 180 degrees.